Partial diallel between two groups

Muhammad Yaseen

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1 Abstract

When parents fall into two groups (for example lines and testers, or two heterotic groups) and each parent of one group is crossed with each parent of the other, `PartialDiallel()` gives the combining ability of each group and the specific combining ability of the crosses.

2 The data

```
head(PartialDiallelData)
```

```
  Cross1 Cross2 Rep     y
1      1     11   1 18.18
2      1     12   1 16.40
3      1     13   1 13.12
4      1     14   1 17.71
5      2     11   1 17.55
6      2     12   1 18.05
```

```
with(data = PartialDiallelData, expr = table(Cross1, Cross2))[1:3, ]
```

```
      Cross2
Cross1 11 12 13 14
     1  4  4  4  4
     2  4  4  4  4
     3  4  4  4  4
```

Ten parents (1 to 10) are crossed with four parents (11 to 14), in four replicates.

3 The analysis

```
p <-
  PartialDiallel(
      y      = y
    , Rep    = Rep
    , Cross1 = Cross1
    , Cross2 = Cross2
    , data   = PartialDiallelData
    )
knitr::kable(x = p$ANOVA, digits = 4)
```

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Treat	39	144.7748	3.7122	2.7460	0.0000
GCA I	9	58.5418	6.5046	4.8116	0.0000
GCA II	3	43.0531	14.3510	10.6158	0.0000
SCA	27	43.1800	1.5993	1.1830	0.2654
Error	117	158.1672	1.3519	NA	NA

```
knitr::kable(x = p$Genetic.Components, digits = 4)
```

	Components	Percent
GCA I	0.3066	0.4044
GCA II	0.3188	0.2974
SCA	0.0619	0.2983

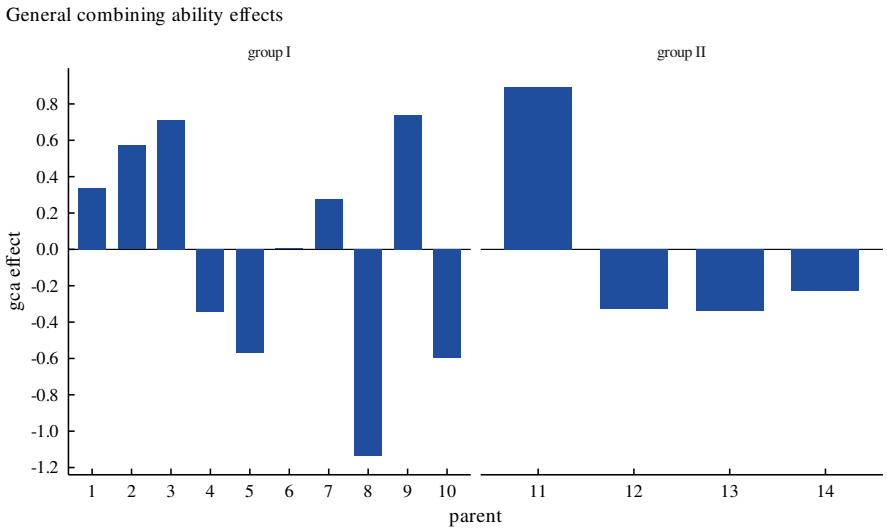
With L and M parents in the two groups, $\sigma^2_{g^I} = (MS_{g^I} - MS_s)/(BM)$, $\sigma^2_{g^{II}} = (MS_{g^{II}} - MS_s)/(BL)$ and $\sigma^2_s = (MS_s - MS_E)/B$. `Percent` is each source's share of the treatment sum of squares.

4 Effects

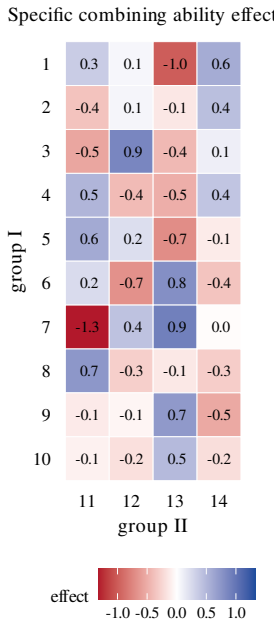
```
round(x = p$General, digits = 3)
```

```
    1     2     3     4     5     6     7     8     9    10    11
0.338 0.571 0.712 -0.343 -0.567 0.005 0.275 -1.138 0.741 -0.594 0.895
   12    13    14
-0.329 -0.339 -0.227
```

```
plot(p)
```




```
plot(p, which = "sca")
```



5 Summary

Both groups show significant general combining ability; the specific combining ability of the crosses is small.

6 References

Kempthorne, O. and Curnow, R. N. (1961). The partial diallel cross. *Biometrics*, 17(2), 229–250.

Kempthorne, O. (1957). *An Introduction to Genetic Statistics*. John Wiley and Sons, New York.

Singh, R. K. and Chaudhary, B. D. (2004). *Biometrical Methods in Quantitative Genetic Analysis*. Kalyani Publishers, New Delhi.